UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,085	02/02/2005	Hiroo Muramoto	20241/0202402-US0	8505

7278 7590 03/08/2007

DARBY & DARBY P.C.
P. O. BOX 5257
NEW YORK, NY 10150-5257

EXAMINER	
BERNSHTEYN, MICHAEL	
ART UNIT	**PAPER NUMBER**
1713	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/523,085	MURAMOTO ET AL.	
	Examiner	Art Unit	
	Michael Bernshteyn	1713	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-29 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-29 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 02 February 2005 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 07/27/05,03/20/06,.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-27 are rejected under 35 U.S.C. 103(a) as being obvious over Khan et al. ("ABA triblock comb copolymers with oligo(oxyethylene)side chains as matrix for ion transport", Makromoleculare Chemie, 190, 1069-1078 (1988)) in view of Giles et al. (U. S. Patent 5,196,484).

With regard to the limitations of claims 1-3, 16-17 and 27, Khan discloses ABA triblock copolymer consisting of two terminal blocks (A) of comb-like polymethacrylate with oligo(oxyethylene) side chains (on average eight oxyethylene units per side chain) and a middle block B of polystyrene, which were synthesized by anionic polymerization. The ratios A/B were varied. The polymers were then solution-cast from tetrahydrofuran solutions of lithium perchlorate, and the homogeneous, solvent-free polymer electrolyte systems tested for their thermal characteristics (DSC) and conductivity. The inclusion of a polystyrene block in the comb-like polymethacrylate electrolyte vastly improves their film-forming and mechanical properties, but also lowers the conductivity. Addition of dimethytetraethyleneglycol (2,5,8,11,14-pentaoxapentadecane) enhances the ion conduction, which can reach values of 10^{-4} $\Omega^{-1}.cm^{-1}$ at 70°C, depending on salt and styrene content (abstract).

The only difference between Khan's triblock comb copolymer and the claimed composition is the sequence of a block chains A, B and C: in the claimed composition the block chain A is in the middle while in Khan's copolymers it is located in the ends.

Giles et al discloses ABA triblock polymers, the A block being rigid having a transition away from its rigid phase above 70°C, the B block being wholly or partly ion-coordinating, elastomeric or amorphous, the B/A block length ratio being greater than 1. When the B block is complexed with an ionic salt these polymers act as polymeric electrolytes, which may be used in cells etc. Preferred polymers are those where HC=CH sites in the polybutadiene segment of a polystyrene-polybutadiene-polystyrene polymer are replaced by $-CH_2CH-X-(CH_2CH_2O)_m-R$, where X is link, R is alkyl. A preferred salt is $LiCF_3SO_3$ (abstract).

Giles discloses that the B-blocks are ion-coordinating, and the atom in the B-block responsible for ion-coordination is oxygen in an oxyalkane sequence containing 2 to 6 carbon atoms between neighbouring oxygen atoms. Preferably, the oxyalkane sequence is a polyoxyethylene sequence, i.e.: $-(CH_2-CH_2O-)_m-$ where m is an integer. The ion-coordinating B-block is elastomeric or amorphous. It is therefore desirable to have only short oxyalkane sequences so as to reduce the amount of ambient temperature crystallisation. Alternatively, when m is rather high, B-block plasticisers may be mixed with or blended with the polymer, for example low mass (less than ca 800) polyethylene glycol dimethyl ether. Preferably, the value of m should lie in the range 2-22, for example 7-17, which is within the claimed range according with the limitations of claims 7-8 and 21-22 (col. 4, line 66 through col. 5, line 15).

Both references are analogous art because they are from the same field of endeavor concerning new triblock copolymers for solid polymer electrolytes.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate polymethacrylate with oligo(oxyethylene) block in the middle as taught by Giles in Khan's triblock comb copolymers in order to reduce the amount of ambient temperature crystallization (US'484, col. 5, lines 9-10), and thus to arrive at the subject matter of instant claims 1-3, 7-8, 16-17, 21-22 and 27.

With regard to the limitations of claims 4-6, 9-11, 18-20 and 23-24, Khan does not disclose a degree of polymerization and molar ratio between repeating unit of monomers (I), (II) and (III).

It is noted that the degree of polymerization and the molar ratio between repeating unit of monomers (I), (II) and (III) are result effective variables, and therefore, it is within the skill of those skilled in the art to find the optimum value of a result effective variable, as per ***In re Boesch and Slaney*** 205 USPQ 215 (CCPA 1980). See also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382: "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."

With regard to the limitations of claims 12 and 25, Khan discloses that a number average molecular weight of the copolymers is 30,000-170,000, which is within the claimed range (page 1071, Table 1).

With regard to the limitations of claims 13 and 26, Khan does not disclose that a solid polymer electrolyte exhibits a microphase separated structure.

However, in view of substantially identical composition between Khan and instantly claimed solid polymer polyelectrolyte (exactly the same polymerized monomers, electrolyte salts, number average molecular weight of the final copolymers being obtained by the same method of anionic polymerization), it is the examiner position that Khan's composition possesses this property. Since the USPTO does not have equipment to do the analytical test, the burden is now shifted to the applicant to prove otherwise. ***In re Best*** 195 USPQ 430, (CCPA 1977).

Even assuming that the claims are not anticipated by the reference, it would have been obvious to one of ordinary skill in the art to make the polymer having the claimed properties using the claimed process because it appears that the reference generically embrace the claimed subject matter and the person of ordinary skill in the art would have expected all embodiments of the reference to work. Applicants have not demonstrated that the differences, if any, between the claimed subject matter and the subject matter of the prior art examples give rise to unexpected products.

With regard to the limitations of claims 14 and 15, Khan discloses that electrolyte salt is lithium perchlorate $LiClO_4$ (abstract, page 1075, Table 3).

2. Claims 28 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakanishi et al. (U. S. Patent 6,096234).

Nakanishi discloses a cross-linked polymer solid electrolyte and a method of manufacturing the same. A crosslinking agent is added to a block-graft copolymer

composed of a polymer block chain A represented by formula I and a polymer block chain B represented by formula II; a high energy ray is irradiated to the block-graft polymer in order to crosslink the entire system; and an nonaqueous electrolytic solution is added to the block-graft polymer. There is also disclosed a composite solid electrolyte for use in a solid electrochemical element. The composite solid electrolyte includes an electrically insulating material, an alkali metal salt, a block-graft copolymer composed of a polymer block chain A represented by formula I and a polymer block chain B represented by formula II, and an aprotic organic solvent (abstract).

The composite solid electrolyte employs, as a polymer component, a block-graft copolymer wherein a graft chain portion and a backbone molecule portion show a micro layer separation structure. Thus, the graft chain portion forms a layer for diffusing ions and can hold a large amount of the aprotic solvent. Accordingly, the obtained composite solid electrolyte exhibits high ionic conductivity. Also, since a porous membrane formed from electrically insulating plastic is used to mechanically support the polymer component, even a thin electrolyte membrane has a sufficiently large mechanical strength and sufficient self-supportability. Accordingly, the obtained composite solid electrolyte has low absolute resistance (col. 7, lines 55-67).

Since a crosslinking agent is added to a block-graft copolymer X and a high-energy ray is irradiated onto the copolymer to cause crosslinking throughout the copolymer, backbone molecules form a pseudo-cross-linked structure, thereby enhancing the mechanical strength of the film, while the graft component forms a

continuous phase in order to secure passages for metal ions and serves as a compatibilizer for stably holding the electrolytic solution (col. 6, lines 6-13).

3. It is worth to mention that Examiner has cited particular columns and line numbers or figures in the references as applied to the claims for the convenience of the applicant. Although the specified citations are representative of the teaching in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant, in preparing the responses, **to fully consider the references in entirety as potentially teaching all or part of the claimed invention**, as well as the context of the passage as taught by the prior art or disclosed by the examiner.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Bernshteyn whose telephone number is 571-272-2411. The examiner can normally be reached on M-F 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael Bernshteyn
Patent Examiner
Art Unit 1713

MB
03/02/2007

DAVID W. WU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700